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ARMORED MEDICAL RESEARCH LABORATORY  
Fort Knox, Kentucky

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Project No. 22  
File No. 727-3 GNOML

28 December 63

1. PROJECT: No. 22, Test of Hammock, Jungle, Impregnated with "Preventol G-4".

a. Authority for Test: Reference, 1st Indorsement, Headquarters Army Ground Forces, File 427/47. (6 November 1943) GNRQT-6/60280, dated 17 November 1943, subject: Hammock, Jungle.

b. Purpose - To determine whether dermatitis or other skin reactions result from the use of Hammocks, Jungle, Impregnated with "Preventol G-4", under simulated jungle conditions.

2. DISCUSSION:

a. Because a number of cases of dermatitis occurred in women working with canvas impregnated with the anti-mildew agent "Preventol G-4", hammocks similarly impregnated were tested to determine whether dermatitis occurred in soldiers sleeping in them.

b. Tests were of two types:

Patch tests: These were done initially for primary skin irritation on 112 men and later for skin sensitization on 95 men. In 10, the patches were applied during a routine acclimatization test in the Laboratory Hot Room. In the remainder, the subjects were tested while on routine company duty. In 15 men, (1) canvas, (2) netting and (3) rubberized rain-proof cover were each used for patch material. In the remainder only the canvas of the hammock was used since this was the material in most intimate contact with the skin.

Sleeping tests: These were carried out on 12 subjects who slept in the hammocks a total of 95 man-nights. For details, see Appendix A.

c. Diet, general health and irritants will influence the behavior of the skin with respect to sensitizing agents. The results of these experiments may therefore, be accepted as applying only to military personnel who are exposed under like circumstances. In the absence of any evidence of primary irritation or sensitization in these tests, one may, however, anticipate only minimal effects even under the most unfavorable circumstances.

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3. CONCLUSIONS:

a. No dermatitis which could be attributed to the hammock developed in any subject. There was the usual prickly heat and scattered papular eruption on the thigh, abdomen, groin and buttocks which is almost universal in men living in hot environments. These lesions were notably prevalent in areas covered by shorts, and thus not directly exposed to hammock surfaces.)

b. In 112 men to whom patch tests were applied, there was no instance of irritation or erythema with initial contacts of 24 or 48 hours. In the 95 on whom a second patch was applied in the same spot 10 days after the first there were no sensitization reactions.

4. RECOMMENDATIONS:

a. Hammocks, Jungle, impregnated with "Preventol G-4" be considered safe for use so far as danger of dermatitis is concerned.

b. Tensile strength of the end spreader-ropes in saturated atmospheres be checked for adequacy.

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#1 - Appendix A  
#2 - Table I

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## APPENDIX A

### EXPERIMENTAL CONDITIONS AND PROCEDURES

#### 1. Patch Tests.

a. Tests for contact dermatitis (112 men) and sensitivity reactions (95 men) were conducted on two groups of men, divided as follows:

- (1) GROUP I. Preliminary studies were made on 15 soldiers from the Armored Replacement Training Center with 3 materials, (a) canvas, (b) netting and (c) rubberized shelter material--all taken from a hammock impregnated with "Preventol G-4" furnished by the Office of the Quartermaster General from the Philadelphia Quartermaster Depot. Ten of these men were tested in the hot room where they had been living for from 3 to 4 weeks in a simulated jungle environment. They were retested for sensitivity 10 days later.
- (2) GROUP II. Since no reactions occurred in Group I, patch tests using hammock canvas only were conducted on 97 additional soldiers, selected at random from Headquarters Company, Armored Command.

b. Round patches 7/8 inch in diameter were applied to the skin of the back, or the upper arm below the vaccination scar. Commercial patch test holders, adhesive plaster or cellulose tape were used to affix the patches. The skin exposed to the test material was examined 24 and 48 hours after exposure. Ten days after the initial application of the patch, a second one was applied to precisely the same site in 95 men to see whether sensitization of the skin had occurred. The skin was reexamined after an exposure of 48 hours.

#### 2. Hammock Tests.

##### a. Environment.

- (1) Men lived in the Laboratory Hot Room in which the dry bulb temperature was maintained as close to 90°F as possible and the wet bulb temperature regulated to give a relative humidity approximately 95% from 0800 to 1700 hours. During the night the dry bulb temperature approximated 84°F with the relative humidity 70-75%. No radiant heat was supplied.
- (2) Pilot tests were made early in November 1943 with men who had been acclimatized to this environment. No skin reactions followed patch tests (15 subjects) or sleeping in the hammock (4 subjects). A special test group of 8 men was then followed for two weeks in the hot room during the

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latter part of November 1943. The men lived in the hot room continuously except for 10-minute clean-up periods in the morning and evening. A 24-hour leave was given for Thanksgiving Day.

b. Experimental Subjects.

- (1) The twelve enlisted men, 19-24 years of age, volunteered to sleep in the hammocks. They were of varying builds, and came from different parts of the country. Two were red-headed, 9 were fair skinned and blond, and 1 was dark; a selection which insured having many subjects with sensitive skin.

c. Clothing.

- (1) Men wore suits, two-piece, HBT during the day except for three days when shorts were worn. In the hammocks, at night, only cotton shorts were worn, permitting exposure of large portions of the skin to the fabric of the hammock.

d. Activity, Food, Water.

- (1) Men usually walked a distance of 12-1/2 miles a day in the hot room and were acclimatized according to the procedure outlined in a previous report (Project No. 2 - Operations at High Temperatures, 2-7, 11, 13, 15, 17, 19, dated 18 October 1943). They ate regular army garrison rations. All drinking water had salt added to a concentration of 0.1%.

e. Sleep Routine.

- (1) Men spent the night in the test hammock. Eight to nine hours were scheduled for sleep. For the first three nights most men slept not more than half the time, but later all men were able to sleep comfortably for eight hours. The hammocks were suspended from hooks set 11 feet apart and there was considerable discomfort from bending the body and other troubles associated with learning to use the hammocks. (See Table I)

RESULTS

1. No skin rash, reaction or dermatitis which suggested a specific contact dermatitis appeared in the experimental subjects sleeping in the Hammock, Jungle, impregnated with "Preventol G-4". Prickly heat of varying degrees of severity occurred in most subjects. It was located in regions subjected to rubbing by clothing on skin or by one skin surface on another and appeared in its worst form over the skin of the crotch which was covered by shorts and was not exposed directly to the hammock. In previous jungle tests, a similar skin condition has been the common experience of men who

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slept in unimpregnated hammocks or on canvas cots in the hot room; or outside the hot room, but worked in it during the day.

2. The patch tests gave no indication of contact irritation or sensitivity to the hammock fabric.

3. The end spreader ropes of several hammocks broke while men were sleeping in them, suggesting the possibility that "Preventol G-4" may have adversely affected the rope.

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APPENDIX A

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# R E S T R I C T E D

## OBSERVATIONS ON 8 MEN SLEEPING IN HAMMOCKS IN JUNGLE ENVIRONMENT

<u>Date</u>	<u>Approximate Hours Sleep (Average)</u>	<u>Miles Walked</u>	<u>Non-specific Skin Reactions to Heat and Sweat</u>	<u>Hammock Rashes</u>
Nov. 18	4	10	2 men with prickly heat	None
Nov. 19	5	12½	3 men with prickly heat	None
Nov. 20	6½	12½ (Shorts)	6 men with prickly heat	None
Nov. 21	7½	5	Prickly heat about same	None
Nov. 22	8	12½	Prickly heat about same	None
Nov. 23	8	12½	Prickly heat about same	None
Nov. 24	8	12½	Prickly heat improving	None
Nov. 25	-	-	Out of room for Thanksgiving	-
Nov. 26	8	12½	Slow improvement in prickly heat with occasional relapse	None
Nov. 27	8	12½	Slow improvement in prickly heat with occasional relapse	None
Nov. 28	8	12½	Slow improvement in prickly heat with occasional relapse	None
Nov. 29	8	12½	Slow improvement in prickly heat with occasional relapse	None
Nov. 30	-	12½	Slow improvement in prickly heat with occasional relapse	None
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Hrs. Exposure	88			
Hrs. Sleep	79			

TABLE I

*Sheet #2*

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